



phuR intergenic mutation results in pleiotropic effects on global gene expression

Khademi, Seyed Mohammad Hossein; Wassermann, Tina; Ciofu, Oana; Jelsbak, Lars

Published in:
Proceedings of the ASM Conference on Pseudomonas 2015

Publication date:
2015

Document Version
Peer reviewed version

[Link back to DTU Orbit](#)

Citation (APA):
Khademi, S. M. H., Wassermann, T., Ciofu, O., & Jelsbak, L. (2015). *phuR* intergenic mutation results in pleiotropic effects on global gene expression. In *Proceedings of the ASM Conference on Pseudomonas 2015* (pp. 126-127). [126] American Society for Microbiology.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

phuR intergenic mutation results in pleiotropic effects on global gene expression

S. M. Hossein Khademi¹, Tina Wassermann², Oana Ciofu² and Lars Jelsbak¹

¹ Department of Systems Biology, Technical University of Denmark, Lyngby, Denmark

² Department of International Health, Immunology and Microbiology, Costerton Biofilm Center, University of Copenhagen, Denmark

We have previously found a positive selection for promoter mutations in *Pseudomonas aeruginosa* DK2 leading to increased expression of the *phu* (*Pseudomonas* heme utilization) system. By mimicking conditions of the CF airways *in vitro*, we experimentally demonstrated that increased expression of *phuR* confers a growth advantage in the presence of hemoglobin, thus suggesting that *P. aeruginosa* evolves towards iron acquisition from hemoglobin.

Further analysis of the effect of this promoter mutation in *P. aeruginosa* lead to discovery of new additional phenotypes such as enhanced inhibition of *Staphylococcus aureus* and a clear change in pigmentation of *P. aeruginosa* from white to green/yellow. To begin to understand the underlying mechanism of these pleiotropic effects, we performed Affymetrix GeneChip DNA microarray analysis on isogenic strains of *P. aeruginosa* DK2 with (M2) and without (WT) the *phuR* promoter mutations.

We find 163 gene expressions to be statistically different between the two strains, where the most significant difference was observed in the six local genes of the *phu* operon. Moreover, we see an apparent down-regulation of genes involved in other iron uptake system, possibly to compensate for the overexpression of the *phu* system. Interestingly, we find a number of stress related protein genes such as *ibpA*, *grpE*, *hscB*, *clpV1* and *clpX* to be up-regulated in M2 compared to WT. We therefore propose a model where significant overexpression of a membrane associated protein such as PhuR leads to a stress response that re-wires the transcription of certain genes. We are currently pursuing this model by further investigation of the target genes.